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Dirty Electricity and Electromagnetic Radiations by Lightning Devices

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ABSTRACT: In the 21st century EMF radiations have received substantial attention as a potential threat to the health and safety of people living in the locality of high voltage transmission lines, power stations, electric distribution substations and even in closeness to electrical and electronics household appliances. In this paper efforts are made for measurement and effects of EMF radiations & also from the high voltage transmission line, power station, electric distribution substation and electrical household appliances in the houses. The results were logged in the magnetic and electric field strength with the units of milligauss (mG) and volt per meter (V/m) correspondingly. Several studies have examined the possible biological effects of electromagnetic fields on human beings as shown in this paper. Technology benefits can be realized by adopting radiation protection shield devices for EMF blocker to avoid health risk and promote human health.

KEYWORDS: Radiations, Dirty electricity, Harmonics, Electromagnetic Fields.

I. INTRODUCTION

Electric and magnetic fields are invisible spectrum of energy; these are termed as radiation that is associated with the utilization of electrical power and various other types of manmade and natural lighting. EMF is normally analyzed by wavelength and frequency into one of given radioactive categories:

Non-ionizing: Low-level emission which is generally perceived as harmless to humans

Ionizing: High-level emission which has the potential for cellular and DNA damage

Electromagnetic field is a combination of invisible electric and magnetic fields of force. They are generated by human activities, through the use of electricity, also from nature like the Earth's magnetic field. Wireless communication, electricity lines and computer screens are examples of equipments those produce electromagnetic fields. Most of the electromagnetic fields reverse their direction at constant intervals of time, ranging from high radio frequencies through intermediate frequencies to extremely low frequencies. The radiation in form of light which can travel in vacuum is known as electromagnetic radiation (EMR). The electromagnetic radiation consists of natural radiation and man-made electromagnetic fields that are produced either intentionally or as by-products of the use of electrical devices and systems. The natural electromagnetic radiation are generate from terrestrial or extraterrestrial sources such as electrical discharges in the atmosphere and radiations emitted by sun, galaxy and space. Natural fields are having spectrum where random high peak transients or bursts take place -like continuum background. This natural background is orders of magnitude below local field levels produced by man-made radio frequency (RF) sources.[3] The everyday use of devices and systems emitting radiofrequency electromagnetic fields is continuously increasing. Sources which generate high levels of electromagnetic fields are usually found in medical applications. Medical devices used for magnetic resonance imaging, diathermy, hyperthermia, various kinds of RF ablation, surgery, and diagnoses may cause high levels of electromagnetic fields at the patients position or locally inside the patient's body.

The electromagnetic (EM) spectrum due to EMR includes several different classes of radiation: low frequency, radio waves, microwaves, infrared waves, visible light, ultraviolet light, x-rays and gamma rays. Wave frequency differentiates one class of radiation from another. The pollution caused by EMR is due to frequencies which are oscillating slower than visible light waves. Whereas, X-rays and gamma rays are more dangerous but they are

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rarely present workspaces. The electromagnetic spectrum have an array of electromagnetic waves which is raise its frequency from Extremely Low Frequency (ELF) or Very Low Frequency(VLF), through Radio Frequency (RF), to Infrared light, Visible Light, Ultraviolet light, X-rays, and Gamma rays. Generally, electromagnetic radiations can be classified into two types ionizing radiation, non-ionizing radiation as shown in fig.1.

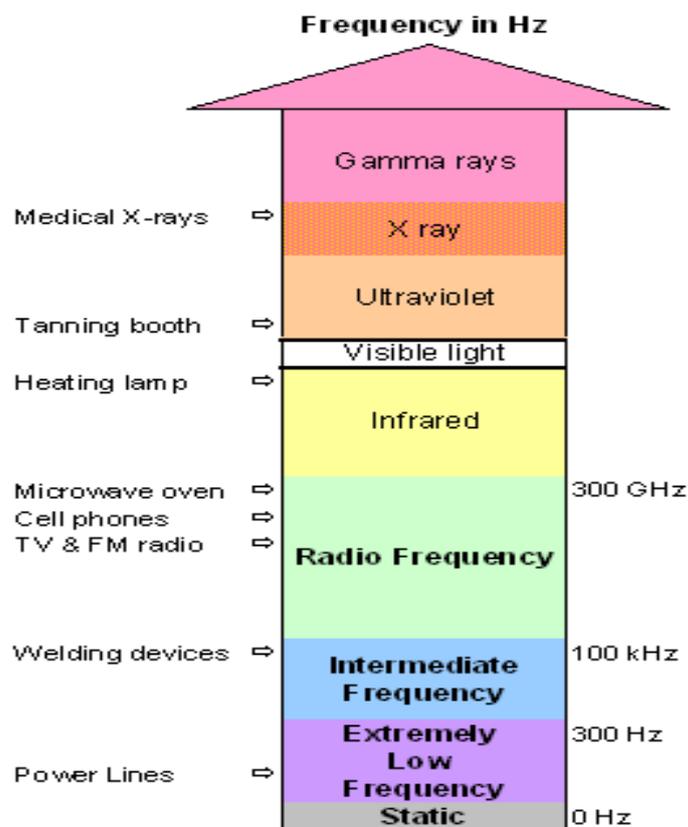


Fig. 1- Electromagnetic waves spectrum

This classification is based on whether they are capable of ionizing atoms and breaking covalent bonds or not. Ultra violet and higher frequency radiations, such as X-rays or gamma rays are ionizing. These pose their own special effects on the life of human beings. Non-ionizing radiation is associated with two major potential hazards that are electrical and biological. Moreover, induced electric current caused by radiation can generate sparks and create a fire or explosive hazard.

II. CLASSIFICATION OF LIGHTNING DEVICES

Various Energy efficient lightning bulbs are being used for illumination purpose. Lightning devices can be subdivided into different categories based on their lighting properties [5].

- Incandescent lamps.
- Compact fluorescent lamps.
- Halogen lamps.
- Light Emitting Diode.
- Fluorescent tube.
- Neon lamps



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Incandescent Lamp: The incandescent light bulb is a source of light that works on the principle of incandescence, i.e. the emission of light is caused due to heating of the filament. The filament of lamp is protected from oxidation by using a glass that is filled with any inert gas or a vacuum. They are manufactured in wide range of sizes, wattage, and voltages. The incandescent light is supplied with electric current through feed-through terminals or wires fixed in the glass. The incandescent lights are widely used in household and commercial lighting applications, such as car headlamps, table lamps and flashlights.

Compact fluorescent lamps (CFL): A CFL is an energy saving light and compact fluorescent tube. CFL is a designed to replace incandescent light bulbs; some types are fitted into light fixtures which were designed for incandescent bulbs. CFL's produce light in different way than incandescent lights. In CFL electric current is driven by a tube that contains a small amount of mercury vapor and argon. These generates invisible ultraviolet (UV) light which excites a fluorescent coating (phosphor) inside of the tube, which is then responsible to emit visible light.

Halogen lamps: The halogen light is similar to an incandescent lamp, it uses halogen gas in it to increase light output and its rated life. These are known for high efficiency, rated life and quality of light compared to normal incandescent lamps. Halogen lamps are used in a number of applications like commercial and residential. Halogen lamps are also used in under-cabinet lighting, work lights and automotive headlamps.

LED (Light Emitting Diode): LED lighting can also be referred to as solid-state lighting because an LED is solid-state device that is similar to the memory in computer. LED consists of four parts: phosphor, lens, die and substrate. The LED die made of gallium nitride (GaN) which is a semiconducting material. When current flows through the die, it originates blue color light. More die are mounted to a substrate which is made of aluminum or ceramic. This is used for easy integration of the LED with a fixture. This provides an efficient way to bring power to the LED.

Fluorescent lamp: A fluorescent lamp uses fluorescence to deliver visible light and is light weight mercury vapor lamp. Energized mercury vapor delivers ultraviolet radiation through discharge process that causes a phosphor coating of the lamp inner wall to radiate visible light when electric current is passed through it. In comparison to incandescent lamps fluorescent lamp changes over electrical vitality into required light a great deal more proficiently. The luminous viability of fluorescent light frameworks is ranging between 50-100 lumens for every watt. Voltage comes across the tube light through a ballast and fluorescent lamp starter. There is no discharge happens initially.

Neon lamps: In neon lamps the atoms of inert gases such as argon, helium or neon never form stable molecules by chemical bonding with other atoms. This is required to apply only a modest voltage to electrodes at the ends of a glass tube that contains the inert gas and the light begins to glow from it.

III. RESULT AND DISCUSSION

Measurement of Electrical Pollution:

Most advanced electronic devices are equipped with switching mode power supplies (SMPS) converters which converts the alternating electrical current into direct current. The main cause of the electrical pollution or dirty electricity is the SMPS converters—which are then added to our electrical wires. Public exposure to electromagnetic (EMF) radiation has increased dramatically over the past 25 years. In present days, people are exposed to a mixture of electromagnetic fields (EMFs) from power lines and wiring; electronics and other electrical items; and wireless devices/technology. A growing body of scientific and unreliable evidence points to possible connections between dirty electricity and a large variety of human health problem. However impact of environment, lack of cleanliness, issues of health effects, public protections have promoted researcher to direct their focus on too pollution free electric power. In this paper experiments have been carried out to measurements of electromagnetic radiation to keep a check on electrical pollution. Some of these are listed as:-



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Electro-magnetic field radiations were measured of 100 W bulbs with the different filaments under the electric stress along with their EMF at 0-100 degree C.

Table 1-EMF emitted by 100 W bulb with the different metal filament under the electric stress at 0-100o C.

S. No.	Metal Filament	Sequence	EMF (mv)
1	Antimony	Positive	+4.2
2	Iron	Positive	+1.31
3	Zinc	Positive	+0.42
4	Lead	Zero	0
5	Copper	Negative	-0.22
6	Platinum	Negative	-0.47
7	Tungsten	Negative	-3.80
8	Constantan	Negative	-4.37
9	Bismuth	Negative	-6.96

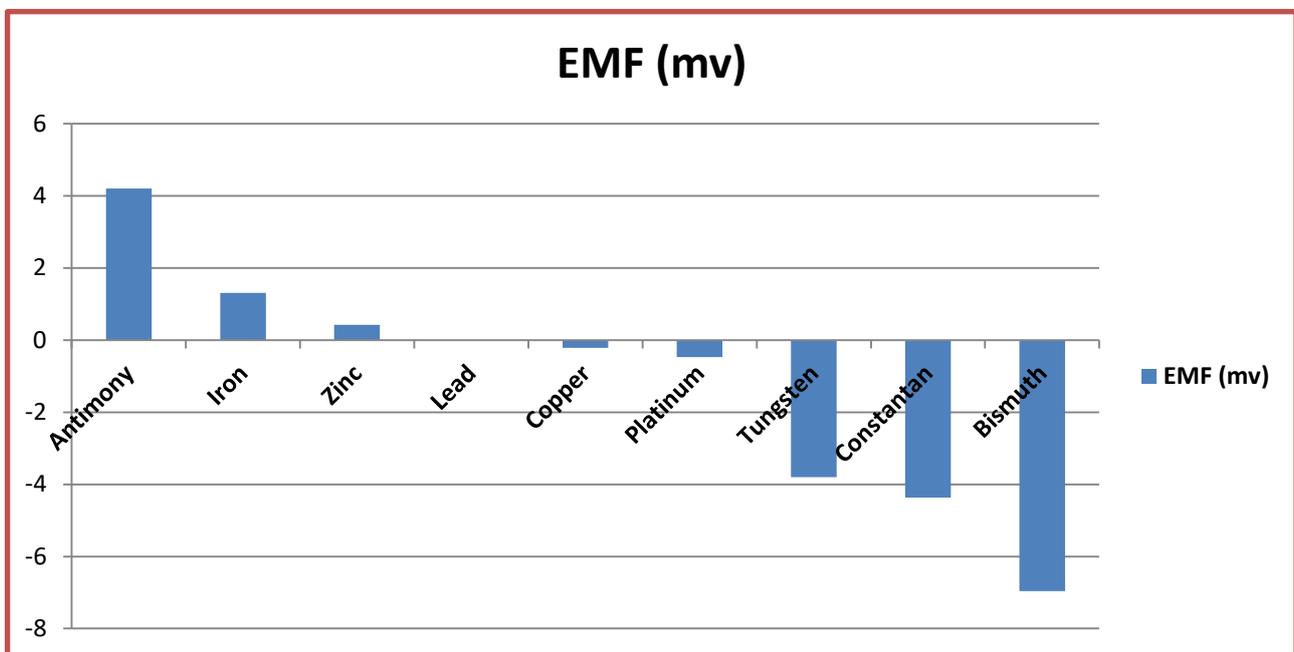


Fig. 2- EMF emitted by 100W bulb with different metal filaments under the electric stress of 0-100° C.

Further an experiment was conducted on 100 W light bulb to check the pollutants and we found Sulfur Dioxide, Nitrogen oxide, Carbon Dioxide, Mercury are the main pollutants emitted from the light bulb. To cross check same experiment was performed on 23 W CFL and it was found that all pollutants are having very less as compared to the CFL.



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Table 2- Reduction of pollutants by using CFL 24W in comparison to 100W Light Lamp.

S. No.	Pollutant	Impact	Pollution produce by CFL	Pollution produce by Light Lamp	Pollution reduction by using CFL in comparison to Light lamp.
1	Sulfur Dioxide	Main Cause of Acid Rain	2.02 lbs	5.32 lbs	3.30 IBS
2	Nitrogen Oxide	Cause smog & Acid Rain	1.1lbs	4.3 lbs	3.2 IBS
3	Carbon Dioxide	Green House Effect	.49 Tons	.99 Tons	.5 Tons
4	Mercury	Cause Acid Rain and Brain Damage	4.9 mg	16 mg	11.1 mg

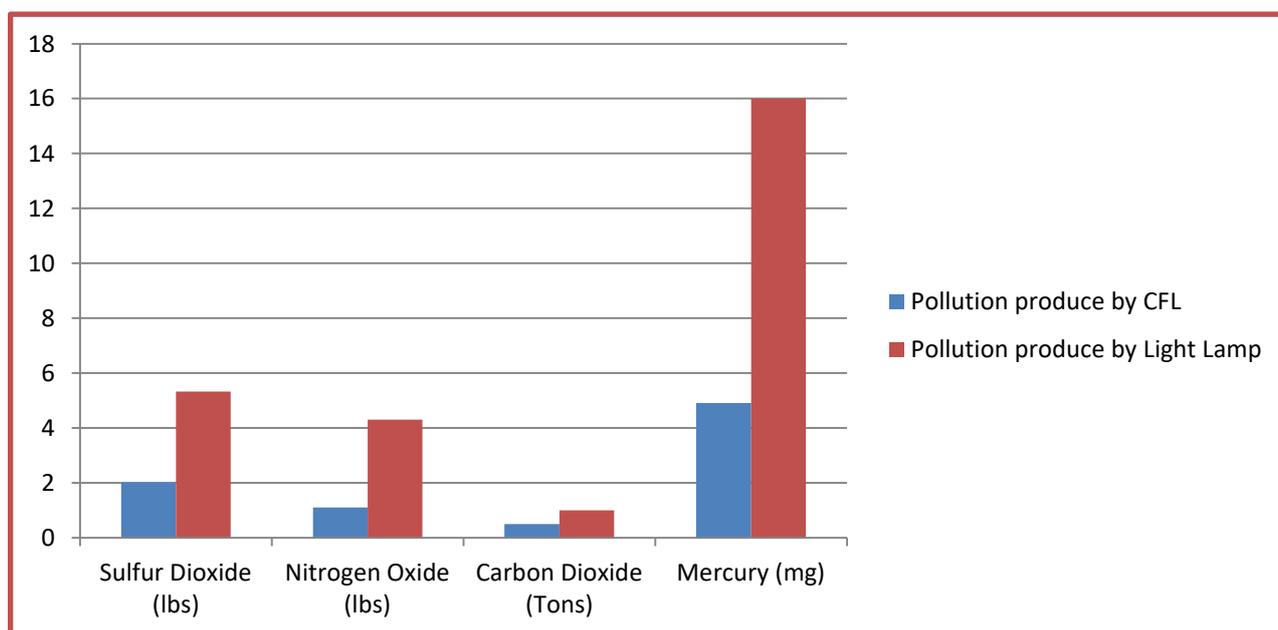


Fig. 3- Reduction of pollutants by using CFL 24W in comparison to 100W Light Lamp.

Dirty electricity is adversely affecting the lives of millions of people. Different kind of problems influenced by dirty electricity on the human beings.

IV. CONCLUSION

The energy efficient compact fluorescent lights that are commercial available generate electro-magnetic fields and frequency radiation in a huge amount. They contain Sulfur dioxide, carbon dioxide and nitrogen dioxide known as neurotoxin. This paper shows the presence & existence of electrical pollution as a conclusion. Also various causes of electrical pollution are represented in this paper.



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